



MIT OPEN COURSEWARE

UNLOCKING KNOWLEDGE • EMPOWERING MINDS





Photo Credit: Christopher Harting

In the spring of 2001, the world greeted MIT OpenCourseWare as a brave experiment. The brainchild of MIT faculty members, OCW drew on a tradition of open sharing at MIT that stretched back at least to the 1950s. But no previous project could match OCW for scope, ambition or elegance. It was a bold new strategy for sharing knowledge and increasing opportunity—but no one knew how well it would work.

Today, OCW is a flourishing MIT institution and a global model for open sharing in higher education. This Institute-wide undertaking has touched more than 300 million people in every country on Earth—all thanks to the dedication and generosity of our faculty, who voluntarily contribute their teaching materials for publication on OCW. We know from our research and from many thousands of user emails that OCW is improving education and bringing new opportunities to people everywhere, sometimes changing lives in profound ways.

MIT's mission statement charges us to advance knowledge and educate students, and to bring knowledge to bear on the world's great challenges for the betterment of humankind. Open sharing of knowledge is the purest manifestation of this mission.

Even as we develop open sharing projects such as the MITx/edX initiative, we continue our commitment to OCW, and we expect its impact to keep growing, even in ways we have not yet imagined.

OCW is here for you. We hope you will use it to pursue your interests, improve your life and make the world a better place for us all.

Sincerely,
President L. Rafael Reif
January 2019



DEFINING
WHAT OPEN MEANS



Photo Credit: Leyre Labarga



This act of generosity is the very essence of how humans should share their knowledge and pass on the stuff that they have learned to people without expecting compensation. MIT OpenCourseWare has literally saved my academic career and saved my life.



TANNAZ, COLLEGE STUDENT, UNITED STATES

height of f

$$\begin{aligned} f &= f_x \hat{i} + f_y \hat{j} + f_z \hat{k} \\ &= \left(\hat{i} \frac{\partial}{\partial x} + \hat{j} \frac{\partial}{\partial y} + \hat{k} \frac{\partial}{\partial z} \right) \cdot (M_i + N_j + P_z) \\ &= M_x + N_y + P_z \quad (\text{scalar}) \end{aligned}$$

Photo Credit: Christopher Harting



The Calculus and Linear Algebra courses on this website have fundamentally changed the way I approach my high school coursework and view math in general. Problems that once seemed “scary” now seem exciting, even elegant. Thank you so much!



ANNIE, HIGH SCHOOL STUDENT, BELGIUM



Photo Credit: Louis Reed

“

MIT OCW has been invaluable to my research by filling in gaps in my general understanding of physics, biology, chemistry and oceanography.

”

CHRIS, UNIVERSITY STUDENT, DENMARK



Photo Credit: Christopher Harting

I have been professor of applied mathematics for nearly thirty years and am still looking for ways to improve and compare my teaching with others. It is nice to know that we share the universal language of science and it will be a privilege to share yours with my students. , ,

PIETER, EDUCATOR, SOUTH AFRICA



Photo Credit: Priscilla Du Preez

“ Whenever I need to learn about something or simply need to get a book reference, I turn to OCW. I've always thought MIT's great, but this leaves me speechless.”

BENSON, INDEPENDENT LEARNER, NEW ZEALAND



Photo Credit: Meriç Dağlı

I am in heaven. I just stumbled onto [OCW], and I am overwhelmed by the number of curricula offered. As a current student, I am often frustrated that I can't take a variety of courses for a better background or just plain interest.
THANK YOU.

“”

KELLY, STUDENT, UNITED STATES



“

[OCW] has been helpful in [informing the] different subjects I teach in Mexico and Canada at the University level. In today's constantly changing and globalized world, education and technology go hand in hand. MIT has set an example of social responsibility that corporate institutions should follow.

”

JORGE, EDUCATOR, CANADA

$$+ \hat{j} \frac{\partial}{\partial y} + \hat{k} \frac{\partial}{\partial z} \Big) \cdot (M_i^a N_j^a P_k^a)$$

$N_y + P_z$ (scalar)

$$\left| \begin{array}{ccc} \hat{i} & \hat{j} & \hat{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ M & N & P \end{array} \right|$$

$$(P_x - M_z) + \hat{k}(N_x - M_y)$$

(vector)

Proof of Divergence Theorem

$$\iint_S \vec{F} \cdot \hat{n} dS$$



Photo Credit: Christopher Harting

My high school does not offer the basics to a course like calculus the year before going into college. I am glad that I can learn it from an online source (even if it is at a college level). Best of all, if I do not understand something. I can just rewind and listen to it again!

HILDA, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Steve Johnson

[OCW] is a very powerful way of empowering a learner like me from the developing world. Ever since I came to know MIT OpenCourseWare, my knowledge and skills have improved tremendously.

“ ”

KALUBA, INDEPENDENT LEARNER, ZAMBIA



Photo Credit: Christopher Harting

“

Discovering and utilizing MIT's OpenCourseWare site was like finding \$40,000 sitting on a park bench. While the price of college in my generation skyrockets, you strive to provide a better-than-ivy-league education for free. Thank you for the opportunity to learn.

”

MICHAEL, HIGH SCHOOL STUDENT, UNITED STATES



Photo Credit: Christopher Harting

I believe that your OCW project is fantastic! As a teacher, I find it a valuable resource and a reliable reference. You are doing a great job.

“ ”

HORATIO, EDUCATOR, POLAND



Photo Credit: Dominick Reuter

“

Getting to learn something you love can sometimes be as satisfying as drinking a glass of water when thirsty. MIT OCW is the medium which is helping quench the thirst of many others like me.

”

PRABHAKAR S., INDEPENDENT LEARNER, INDIA



Photo Credit: Joakim Roubert

“

I have so much appreciation for your institution — you're combining the best knowledge with a concept that transcends social responsibility. And you've just started the true Knowledge Revolution!

”

DAVID, UNIVERSITY STUDENT, COLOMBIA

```
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<meta name="viewport" content="width=device-width, true, 'right' ); ?>/title>
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</head>
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    $logo_pos = $menu_pos = '';
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        $logo_pos = esc_attr($theme_options['logo_pos']);
    }
    if (isset($theme_options['menu_pos'])) {
        $menu_pos = esc_attr($theme_options['menu_pos']);
    }
    $logo_pos_class = fruitfull_get_theme_option('logo_pos_type');
    $menu_pos_class = fruitfull_get_theme_option('menu_pos_type');

```

Photo Credit: Ilya Pavlov



I think it's a beautiful and powerful concept. I have spent hundreds of hours learning neuroanatomy. I've been become addicted to MIT OCW and have moved onto other subjects outside my primary research area, including genetics, computer programming and sociobiology.



LAURENCE, INDEPENDENT LEARNER, IRELAND



Photo Credit: Peter Vanderwarker

“

I'm a university lecturer based in Dubai. I have used some of the HRM case study materials and acknowledged MIT as the source. This is an excellent resource and it gives teachers in 'remote' areas a window on the world. This is real open learning in practice.

”

ROBERT, EDUCATOR, UNITED ARAB EMIRATES



Photo Credit: Christopher Harting



Your generosity has helped inspire my physics students. They all returned 100% positive feedback. 'It made me want to go to university' 'Much better than your lessons ;)' Just a few of the worryingly honest comments received.



NICHILESS, HIGH SCHOOL EDUCATOR, GERMANY



Photo Credit: Josh Boot

“

To find such a brilliant resource online for free is the best thing to happen in a long time. There are many talented people who cannot go to MIT. You have brought MIT to them. Bravo.

”

SEAN, INDEPENDENT LEARNER, CANADA



Photo Credit: Adeolu Eletu

[OCW is a] window to the world of best learning practices. [OCW] led to significant changes in the way I co-learn with my students. I use the video lectures in addition to course material given. I thank all the teachers for providing inputs.

”

PRABHAKAR K., INDEPENDENT LEARNER, INDIA



Photo Credit: Jake Belcher



OCW's been so much more than a supplement. It's been an experience—a surreal one. It almost sounds ridiculous, but here I am, miles away, academically and emotionally bonded to these professors, and awe-struck, laughing, inspired alongside students on the other side of the screen.
MIT OCW, Thank you.



KEONHO, HIGH SCHOOL STUDENT, UNITED STATES

EMPOWERING
RESILIENT MINDS



Photo Credit: Nick Owuor



I took calculus for the first time about 10 years ago, in order to fulfill a degree in engineering. Now, at 60, I am planning to complete a degree in astronomy, so I thought I'd better revisit the math. Thanks so much for offering this courseware online.



HAROLD, INDEPENDENT LEARNER, UNITED STATES

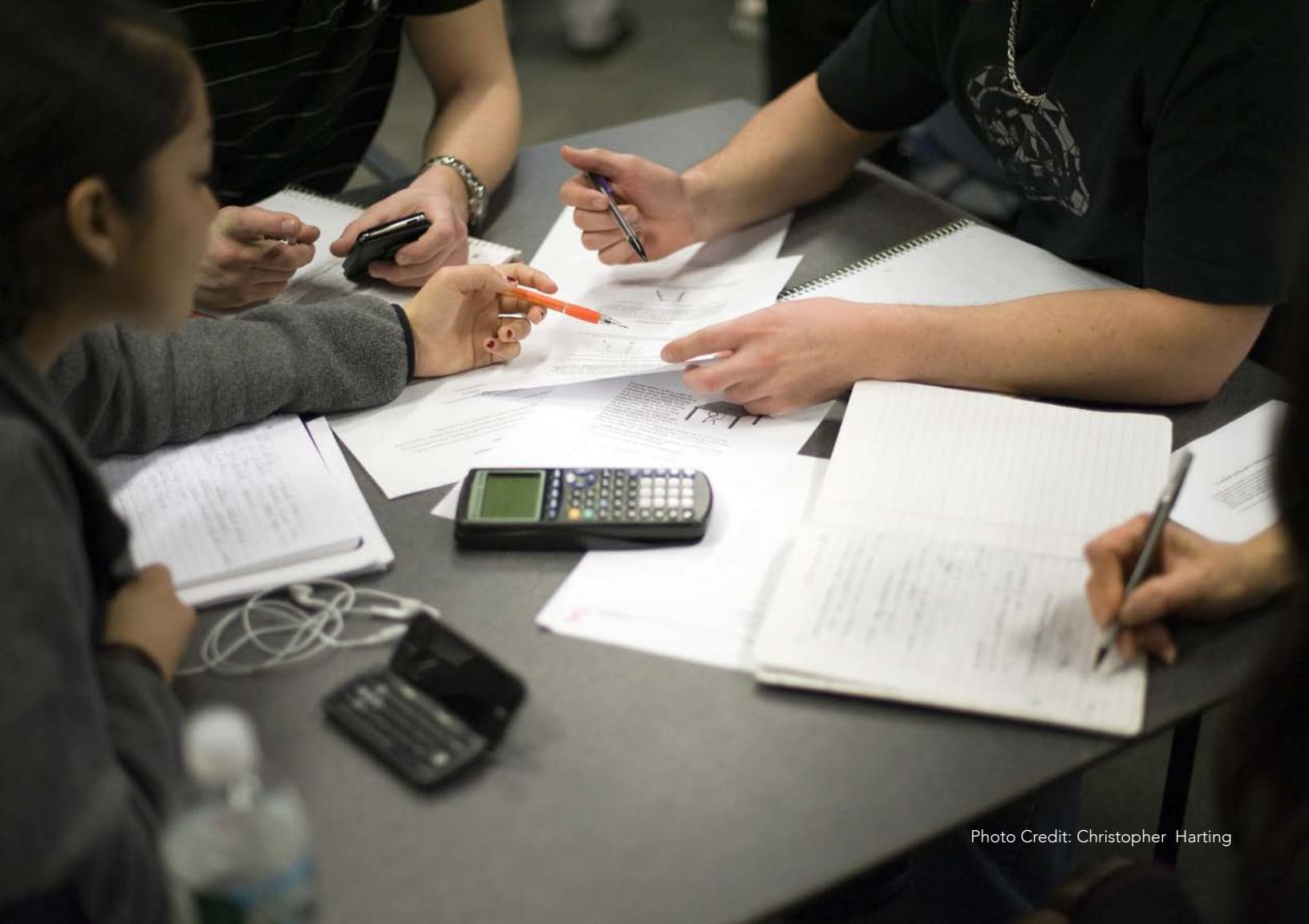


Photo Credit: Christopher Harting

“

I am a student at a community college. I've been taking some time off from school to save money while deciding what career to pursue. I have finally decided that I want to major in Mechanical Engineering. Although I have taken AP calculus I wanted to refresh myself before jumping back into school.

”

TINSLEY, STUDENT, UNITED STATES



Photo Credit: Christopher Burns



It takes all of my resources to have an internet connection right now as I prepare for an entrance test to an elite management institution in India. But your courses and the videos offered by your Alumnus Sal Khan, have given me a ray of hope and a lot of confidence.



NEHA, INDEPENDENT LEARNER, INDIA



Photo Credit: Christopher Harting

“

When I started taking Physics at my community college, my professor wanted to remove me from class for not having the math prerequisites. Through OCW I was able to learn the required calculus. Following an assessment, I was not only admitted to class, but my professor was blown away by my knowledge!

”

ANONYMOUS, UNITED STATES ARMY



Photo Credit: Jake Belcher

“I am taking a significant break from earning a degree in Mechanical Engineering due to a brain aneurysm and I want to keep my skills sharp. Thanks for letting me continue to learn while I heal.
”

ANITA, COLLEGE STUDENT, UNITED STATES

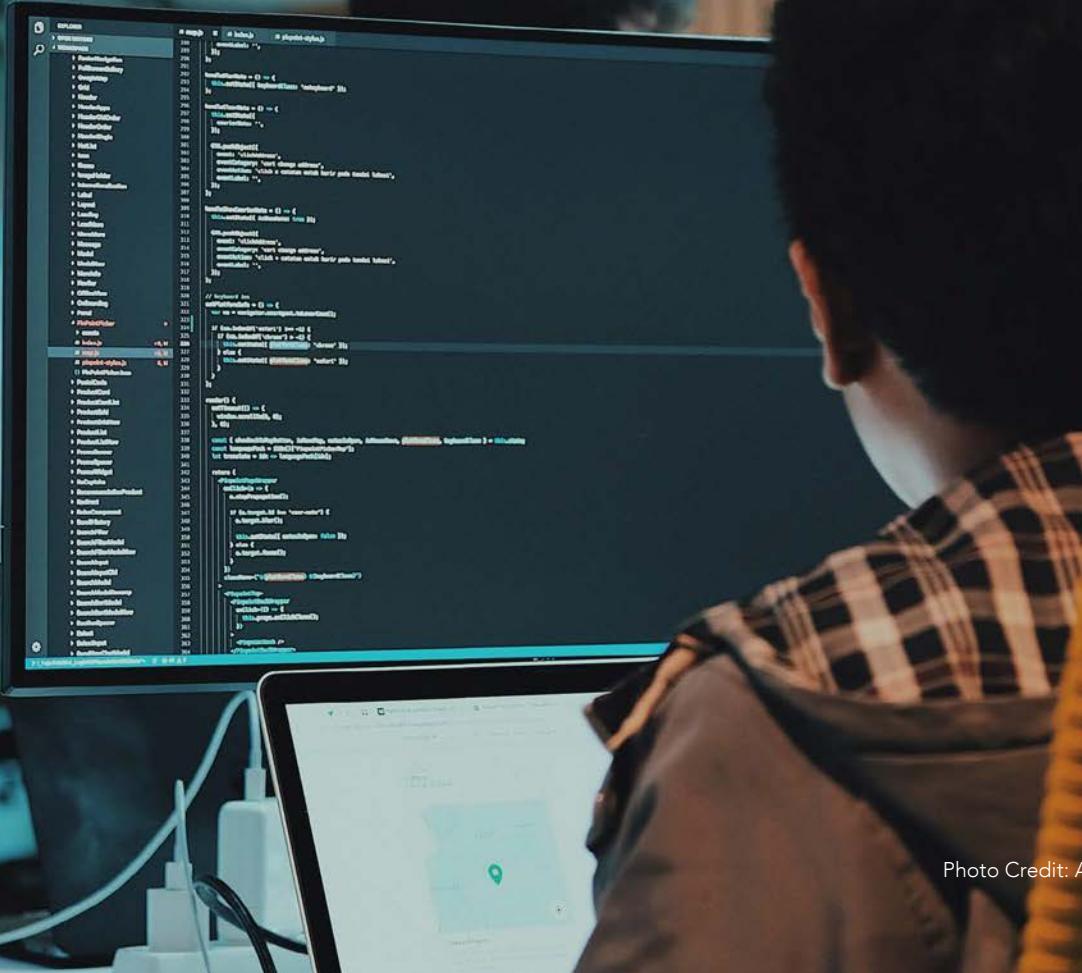


Photo Credit: Arif Riyanto

Because of the course content you so generously provide, my son has the opportunity to get the education he deserves that I could never afford.

LIZ, PARENT, UNITED STATES



Photo Credit: Kolapo Oni

I couldn't go to college after completing high school because I had to work full time to support my family. But I was able to learn so much about computer science using OCW [...] I secured a great job at a startup and I will be going back to college this year.

ELVIS, HIGH SCHOOL STUDENT, NIGERIA

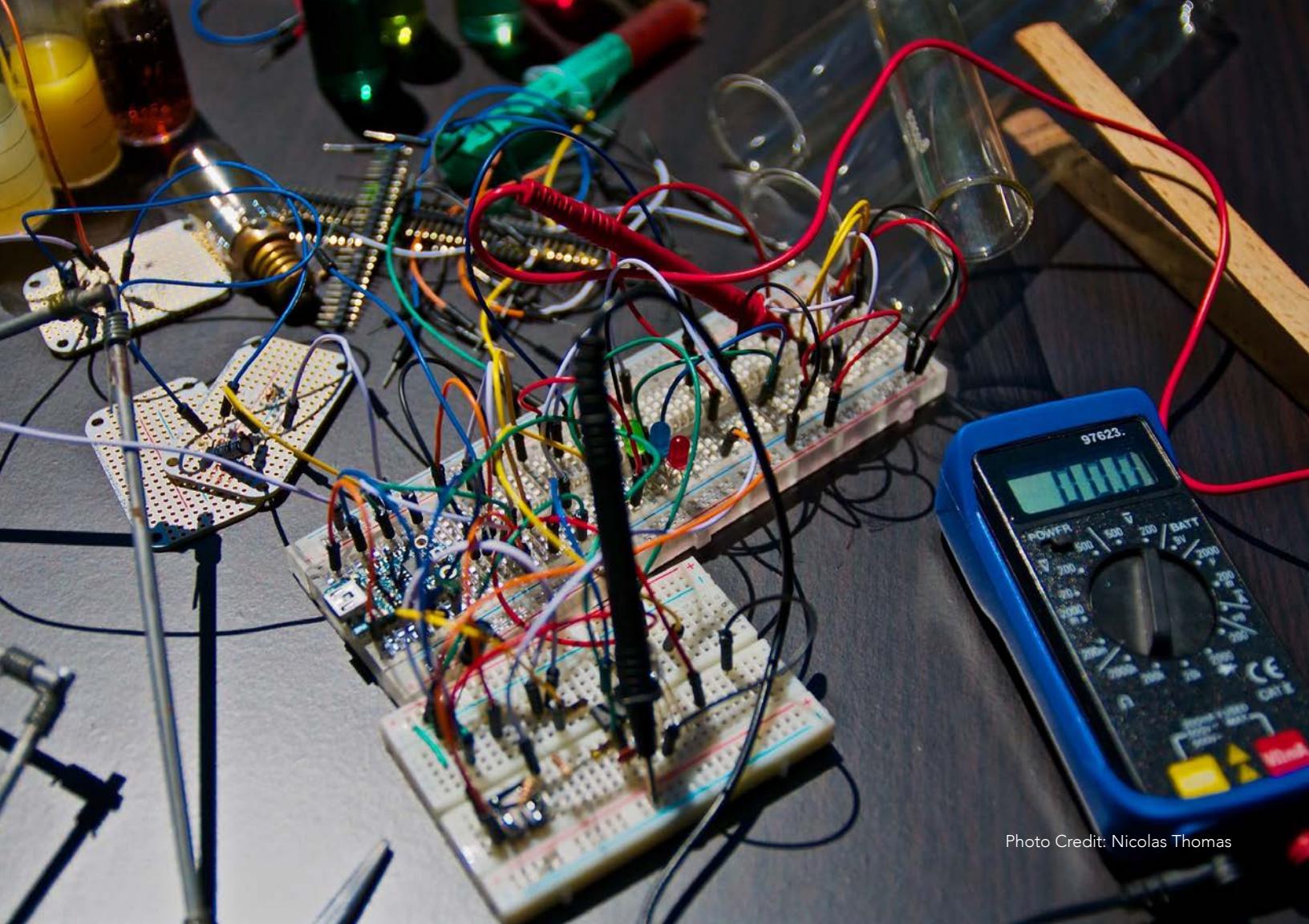


Photo Credit: Nicolas Thomas

I have been attempting to teach myself the basics of building circuits. This site has all the information I need to improve my skills. I can't get enough of it! I have been inspired to further my education.

“ ”

CHRISTOPHER, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Anton Seelus

I am 47 years old and a disabled veteran with bipolar disorder. Your courses set aside the stress and remove the financial hurdles associated with gaining access to any college courses. Thank you for enabling me to improve myself. Keep up the amazing work.

“

DWAYNE, INDEPENDENT LEARNER, UNITED STATES

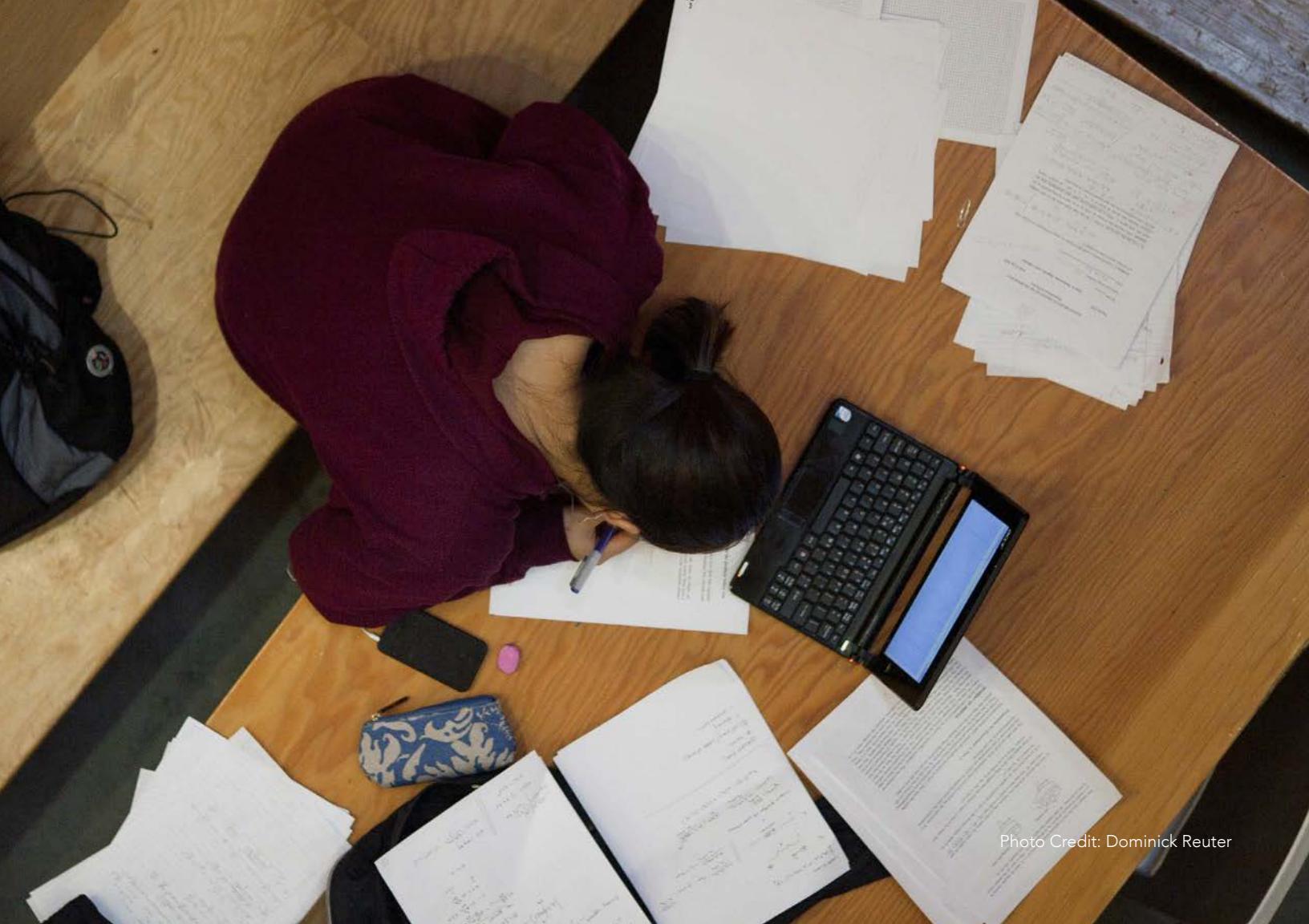


Photo Credit: Dominick Reuter

“

I am a public school teacher in California. In order to update my credential I must pass a test in Linear Algebra. However, all the courses at local colleges are during school hours. Now I can learn the material for free and at my own pace.

”

CHRISTINE, EDUCATOR, UNITED STATES



Photo Credit: Jake Belcher

I have Parkinson's so I don't get out of the house much. Thank you for giving an old man the chance to learn.

”

JOHN, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Jake Belcher

“

Your open courses have really helped to get my confidence levels up. I have a new found faith in and passion for education that I never had. I finally have the courage to apply to university.

”

MICHAEL, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Jan Tinneberg



When my father died one year before I was to graduate high school, life got away from me and the prospects of my going to college disappeared. Thanks to these great lectures I was finally able to learn Calculus. Nearly ten years later, I feel that a previously closed door has been reopened to me.



CARL, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Amarcus Brown

This is the best thing that has ever happened to me. Now, I can see myself getting my diploma at the end of this year.

“ ”

ALVIN, INDEPENDENT LEARNER, KENYA

CREATING A BETTER
WORLD



Photo Credit: Hermann



OCW gives me hope...I can continue to learn about the things I love, to learn from professors and instructors who work at the forefront of scientific and mathematical thought, and that is the greatest gift I could have ever received at this point in my life.



JASMINE, INDEPENDENT LEARNER, UNITED STATES

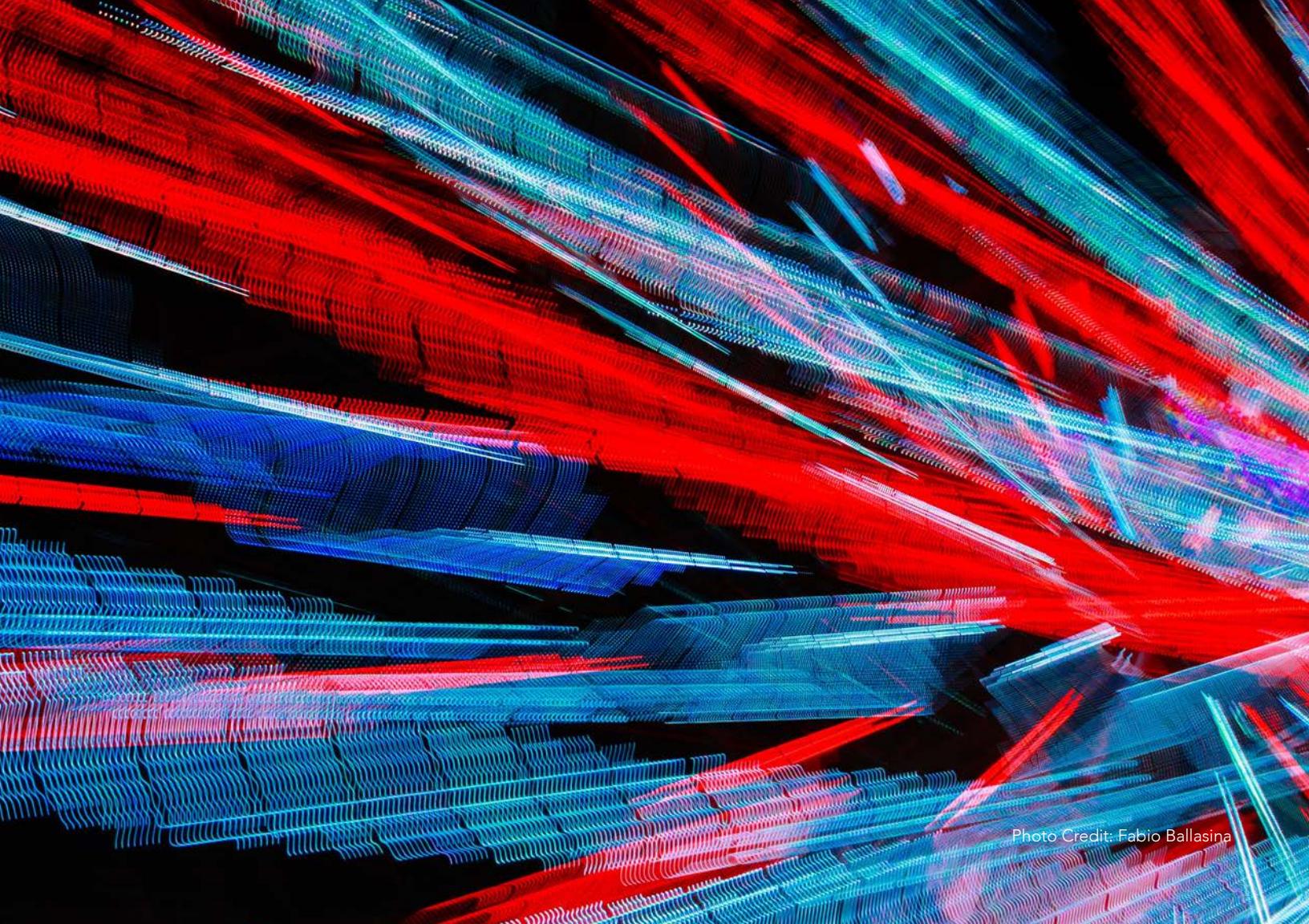


Photo Credit: Fabio Ballasina

“

This is an extraordinary innovation and potentially a very powerful contribution to international development. I am working in Liberia where most of the schools were destroyed in the 15 years of brutal war. There are many bright people in the country who now want to study and learn, but their options are very limited.

”

JEROME, MIT ALUMNUS, LIBERIA



Photo Credit: Ben White

“... this project shows that MIT actually cares about education of not only its students, but everyone, and creates an invaluable source for everyone around the world who craves to learn more.”

NAZLI, INDEPENDENT LEARNER, TURKEY



Photo Credit: Kat Stokes

As a father of a special needs child, it is difficult for me to get out and further my education. OCW provides me with the opportunity to achieve higher level learning right from home.

“ ”

MARK, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Lysander Yuen

“ OCW has been one of my teacher and guide for some time now, from where I learn to enhance my professional knowledge. [...] many like me from Bhutan do not have the privilege to continue our education...”

TSHEWANG, INDEPENDENT LEARNER, BHUTAN



Photo Credit: Mohit Sharma

Opening up the doors of [k]nowledge to people is an act that everyone is thankful for. Your initiative will enable a direct connection between knowledge & learner, with no middleman (school). No more excuses of lack of opportunity. Just inclination suffices now.

”

DEVENDRA, INDEPENDENT LEARNER, INDIA



Photo Credit: Jake Belcher

I am a disabled veteran and I can't afford to attend a university...I am very grateful that I can go to your website and get an education that is on the level that MIT offers...I want to thank you for making it possible to raise my self esteem and keep pushing on...

“ ”

LONNIE, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Jake Belcher

“

As an MIT alum from a developing country (Brazil), I am proud of the beauty (lacking a truly significant word) of this extremely generous [...] MIT initiative.

”

ROGERIO, MIT ALUMNUS, BRAZIL



Photo Credit: Phi Hùng Nguyễn

I mentor kids in robotics [...] and a lot of them are disadvantaged...the kids I work with can go to [OCW] and it gives them access to a learning opportunity their high schools can't give them, or won't.

“ ”

JOE, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Sharon McCutcheon

“

[I] just wanted to say thanks for the work
that you people are doing to ensure that
we young people (no matter the race) are
well educated...

”

OZOEMENA, UNIVERSITY STUDENT, NIGERIA



Photo Credit: Andre Hunter

“

I consider MIT's free sharing of [OCW] as equivalent to the human invention of alphanumeric and symbolic characters, the printing press, and the internet. [OCW], followed by similar steps by other innovative knowledge processing institutions, is an important step forward in the progress of human civilization.

”

MARAGTAS, UNIVERSITY EDUCATOR, KOREA



“ OCW democratizes learning by providing material to anyone who cares to challenge themselves. With respect to mathematics in particular, OCW has taught me something that every student should know: being a genius isn't a prerequisite to understanding complex material. **”**

JOSHUA, INDEPENDENT LEARNER, UNITED STATES



Photo Credit: Steve Johnson



Coming from a developing country I was used to the paradox of a supposedly increasingly open world closing vast fields of knowledge and technology from the majority of their potential beneficiaries...[OCW] is the proof that strong convictions and generosity might simply be all that is needed to change that.



CAMILO, MIT ALUMNUS, COLOMBIA



Photo Credit: Christopher Harting

“

I am a Clinical Psychologist who works with Army personnel...One young sergeant plans to attend university to study business and recently told me he has been listening to your [online] courses on economics. Your courses are giving this very traumatized young man a sense of hope and direction he has otherwise lost.

”

GEORGE, PARENT, UNITED STATES



Photo Credit: Jens Schott Knudsen

OpenCourseWare is teaching me that the point is to learn no matter how you learn, in the end the point is to have the knowledge—I'm just glad that there is another aide in the international quest for knowledge.

,

ALI, UNIVERSITY STUDENT, UNITED STATES

DESIGNED BY:
KEDI HU, CLASS 2020
& HEATHER BASTOS

We thank all of the MIT faculty, staff, community and supporters for making MIT OpenCourseWare possible.

